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RADARSAT Polar Science Gateway

Yves Crevier, Paul Briand
Government-Related Initiatives Program
Canadian Space Agency

Canada

Presentation Outline

- Context and concept of the RADARSAT Polar Science Gateway (RSAT PSG)
- Canadian Earth Observation Assets for IPY
  - Radarsat 1-2, etc.
- RADARSAT Polar Science Gateway Components
- Seek for collaboration opportunities

IPY 2007-2008

- International IPY
  - Received the full IPY endorsement from the International Program Office – March 06
  - Linked to the "Global Inter-agency International Polar Snapshot Year" - GIIPSY proposal #91
- Canada Federal IPY program
  - Participation: 239 Canadian expressions of interest. Govt of Canada funding $150 million.
  - Proposal submitted to the Federal IPY Program Office in March 06
  - Nomination of CSA staffs – Federal IPY Working Groups
- CSA proposal - RADARSAT Polar Science Gateway
  - What: observation source for science and northerners
  - How: use partnerships
  - Scope: Canadian & international - both poles; partners/users from anywhere

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RADARSAT
Polar Science Gateway

- Objectives
  - to create and disseminate a circumpolar Arctic data treasury of satellite-based radar data and derived information products in support of science for climate change research and local needs of northern peoples and communities.

- Highlights
  - Making use of Radarsat archives and missions – RSAT-1,-2,-C
  - Serve urgent Canadian & international goals
  - In support of science and northern communities
  - With partners and levered resources
  - A lasting legacy

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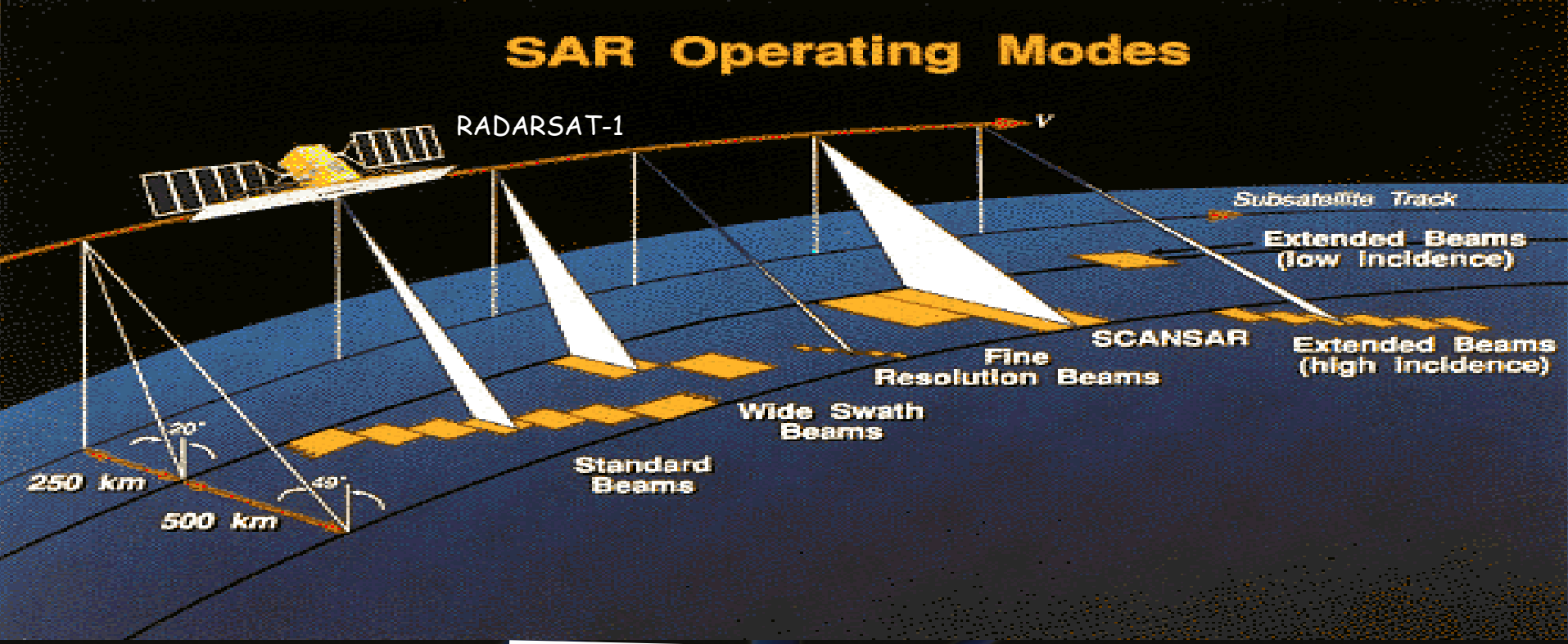
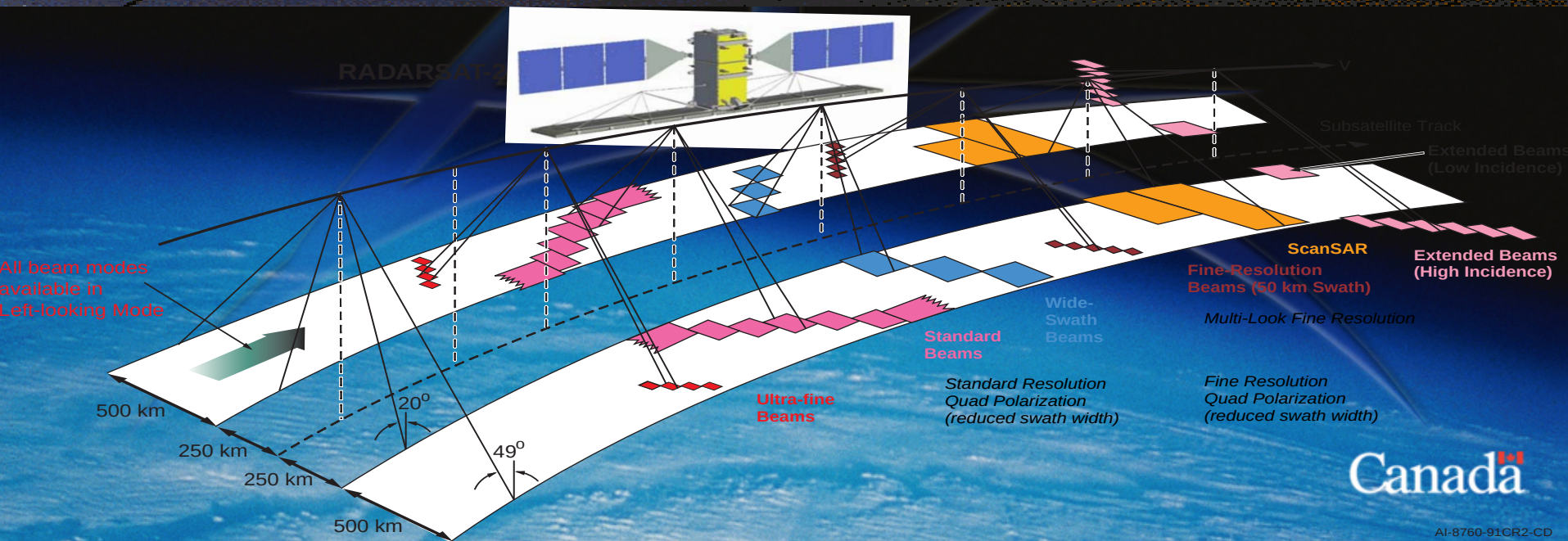
Global Inter-Agency IPY Polar Snapshot Year (GIIPSY)

- Develop an international science plan for coordinated spaceborne observation of the polar regions;
- Obtaining critical benchmark of processes in the Arctic and Antarctic during the IPY and to set the stage for acquiring future benchmarks beyond IPY;
- Also obtaining diverse but integrated set of observations;
- Make the resulting data and derived products available to the international science community;
- Lead by ESA and Ohio State U;
- CSA, DLR, ISRO, JAXA, NASA, IGOS-P Cryosphere…

SAR Operating Modes





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AI-8760-91CR2-CD

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RADARSAT Polar Science Gateway

1. Radarsat Data Treasury

2. Portal

3. Diffusion, outreach & capacity development

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RADARSAT Polar Science Gateway

1. Radarsat Data Treasury

- Existing data: focused Background Mission, CIS data collection
- New data: **Radarsat 1, potential Radarsat 1 extension**, **Radarsat 2** data products
- **Consultation for the definition of thematically intelligent archive for polar regions**

Background Mission Highlights

- **Systematic global land mass** SAR coverage and **stereo coverage** of entire continents suitable for topographic mapping;
- Usage of **different RADARSAT imaging modes**, such as ScanSAR, Standard, Fine, and innovative right-left looking modes;
- **Repeat coverage** including InSAR coverage, of selected regions as a means to detect change; and
- Selected thematic coverage, including island, cities, **glaciers and ice caps.**

RADARSAT 1 Background Missions

Background Mission Title and Coverage Area(s)	SAR Imaging Mode	Year(s)
"Global ScanSAR coverage", including all continental land masses, shelves, polar ice caps	ScanSAR Wide 100 m resolution	1997
"Selected right-and-left looking coverage" of mountainous regions (western & eastern North America, Alps, Himalayas, Japan) during the US-coordinated "Antarctic Mapping Mission (AMM)"	Standard 4 (right-looking) 30 m resolution	1997
"Global ScanSAR Narrow coverage", including seasonal coverage of all continental land masses, continental shelves, polar ice caps	ScanSAR Narrow 50 m resolution	1998
"Global Standard 7 beam coverage", including landmasses of the Americas, Greenland, Europe, Asia, Australia, and Africa	Standard 7 30 m resolution	2000-2002
"Global stereo coverage", including most landmasses of the Americas, Greenland, Europe, Asia, Australia, and Africa	Standard 7, 4 & 2 Standard 7 and Wide 2 30 m resolution	2000-2002
"Standard beam oceanic island coverage" of more than 50 isolated islands around the globe	Standard 5 30 m resolution	
"Fine beam coverage of world cities and capitals", including more than 170 cities	Fine (various beams) 10 m resolution	
"Canadian interferometric mission (CIM)", including the entire Canadian landmass, plus selected areas around the globe, during the US-coordinated "Modified Antarctic Mapping Mission" (MAMM)	Fine 1 10 m resolution	2000-2001

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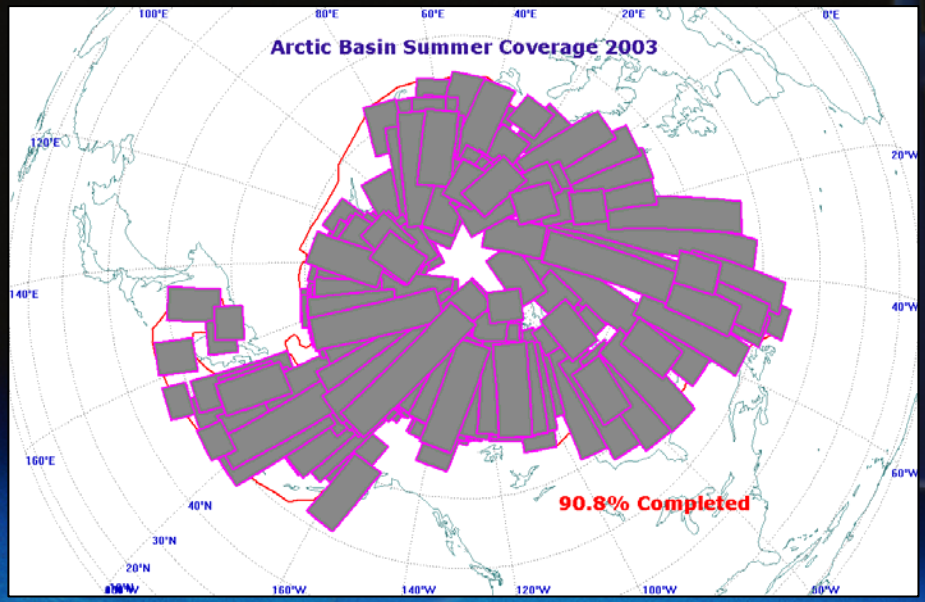
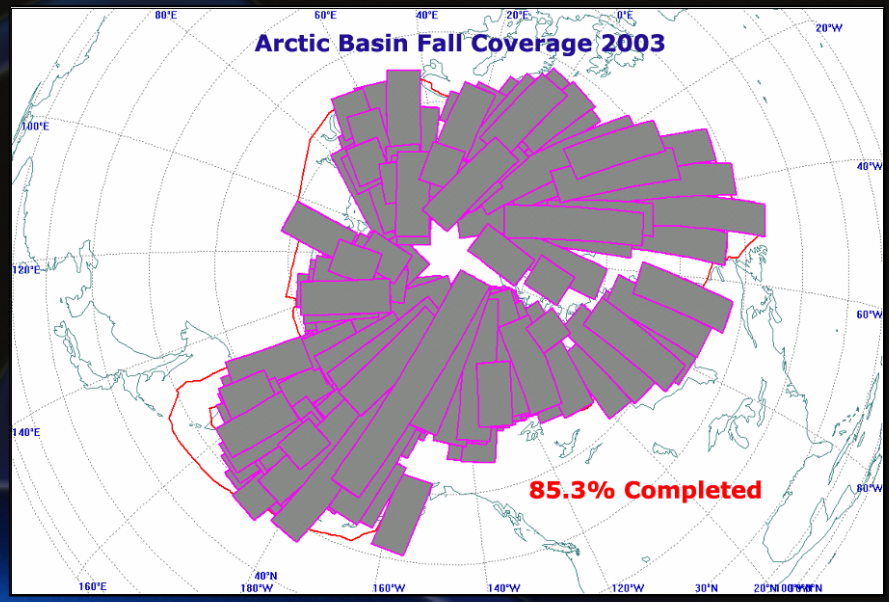
2003 Arctic Basin Coverage

Summer



- Arctic Basin area = 10ºC July Isotherm
- Coverage completion: **~90.8%**
- Start date: **July 30, 2003**
- End date: **August 6, 2003**

Fall



- Arctic Basin area = 10ºC July Isotherm
- Coverage completion: **~85.3%**
- Start date: **October 3, 2003**
- End date: **October 31, 2003**

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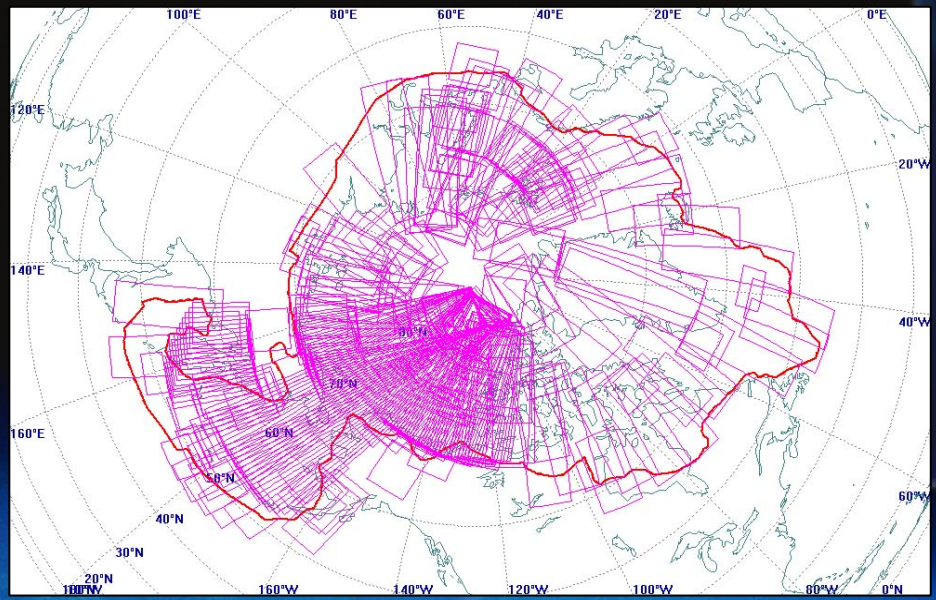
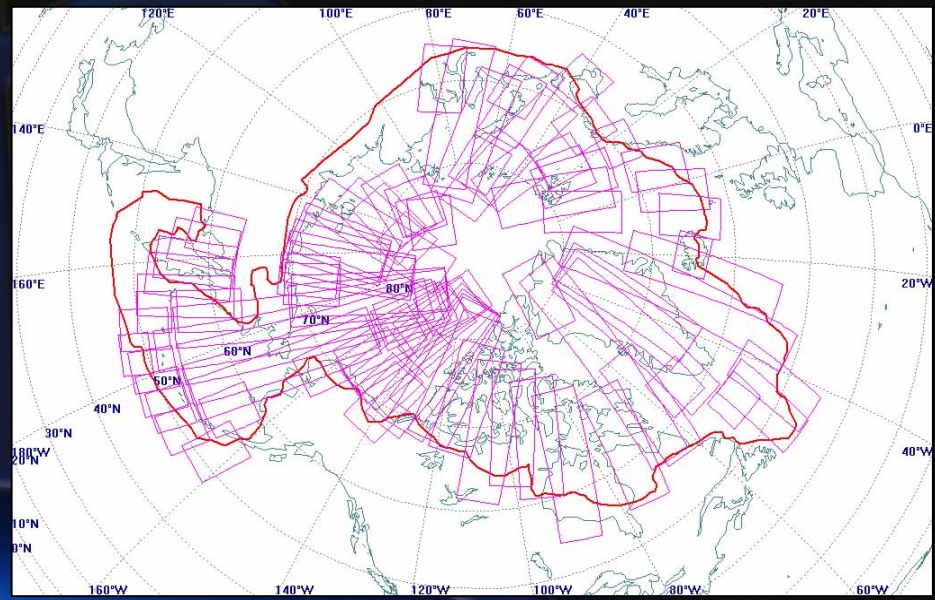
2004 Arctic Basin Coverage

Winter



- Arctic Basin area = 10ºC July Isotherm
- Coverage completion: **~90.6%**
- Start date: **January 9, 2004**
- End date: **February 6, 2004**

Spring



- Arctic Basin area = 10ºC July Isotherm
- Coverage completion: **~77.8%**
- Start date: **April 19, 2004**
- End date: **April 25, 2004**

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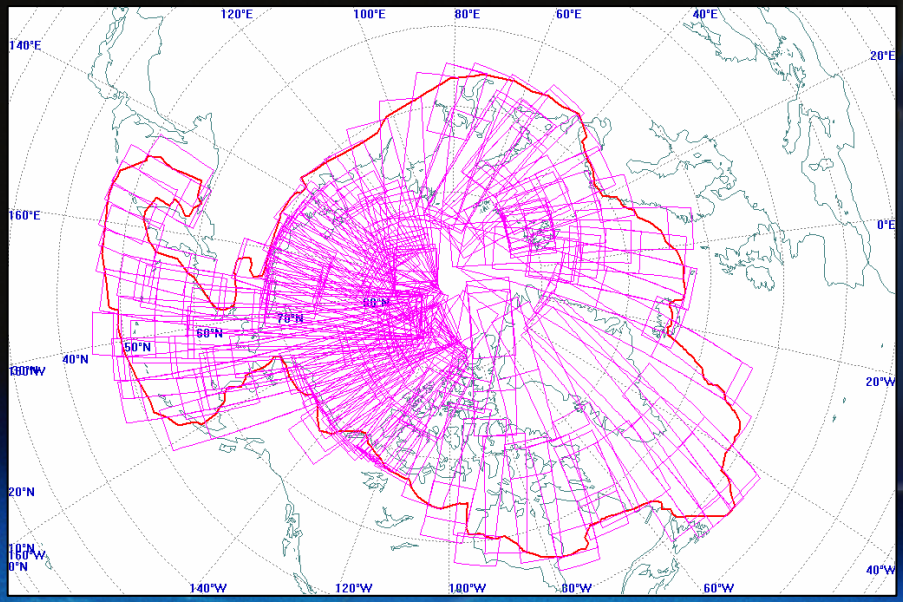
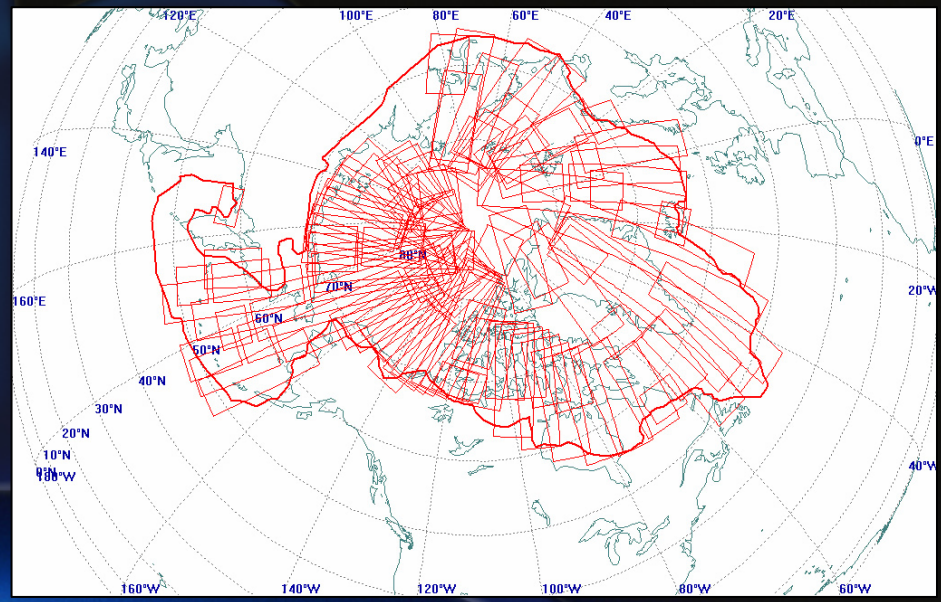
2004 Arctic Basin Coverage

Summer



— Arctic Basin area = 10ºC July Isotherm
Coverage completion: **~98.9%**
Start date: **July 23, 2004**
End date: **August 6, 2004**

Fall



— Arctic Basin area = 10ºC July Isotherm
Coverage completion: **~85.0%**
Start date: **October 4, 2004**
End date: **October 11, 2004**

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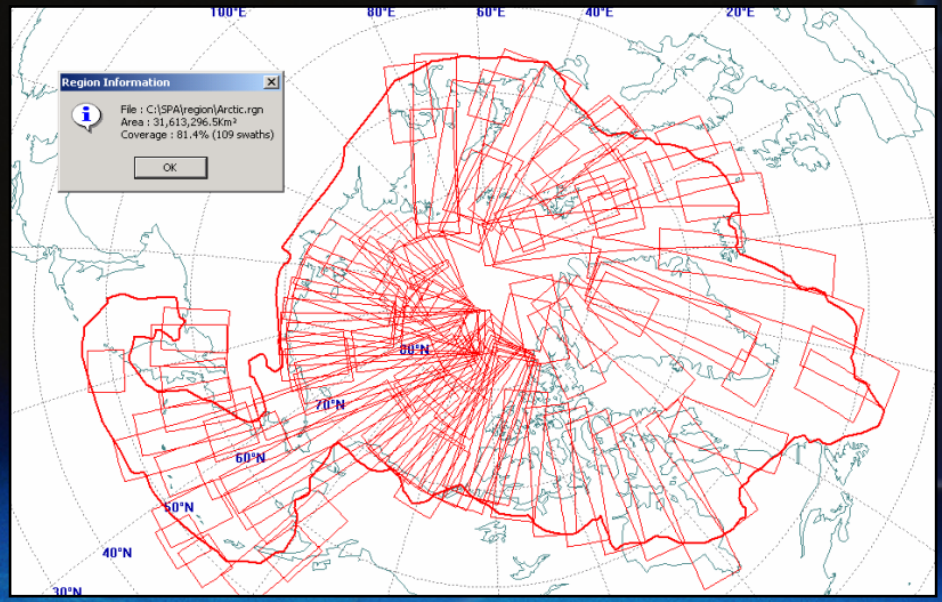
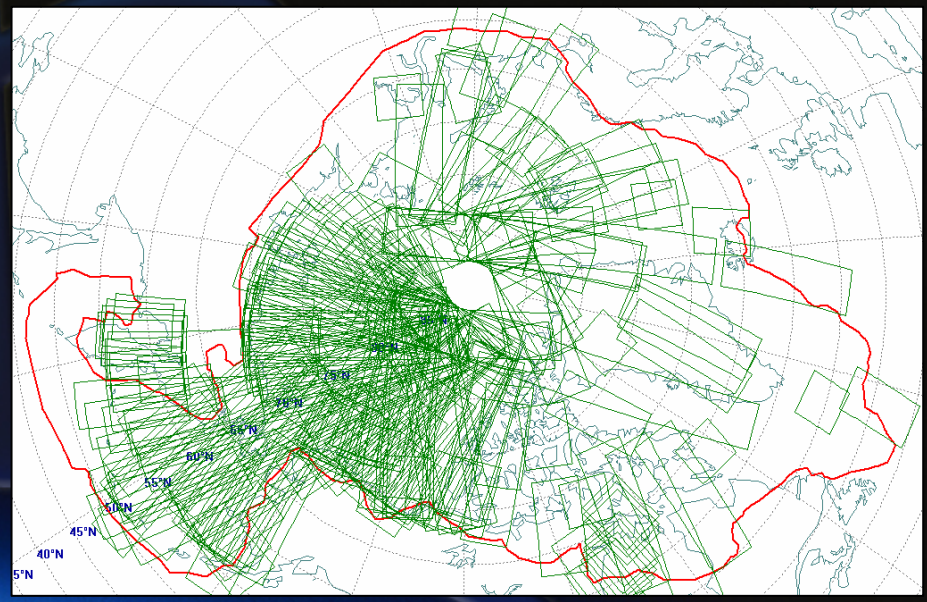
2005 Arctic Basin Coverage

Winter



- Arctic Basin area = 10ºC July Isotherm
- Coverage completion: **~81.4%**
- Start date: **January 8, 2005**
- End date: **February 15, 2005**

Spring



- Arctic Basin area = 10ºC July Isotherm
- Coverage completion: **~76.5%**
- Start date: **April 14, 2005**
- End date: **May 3, 2005**

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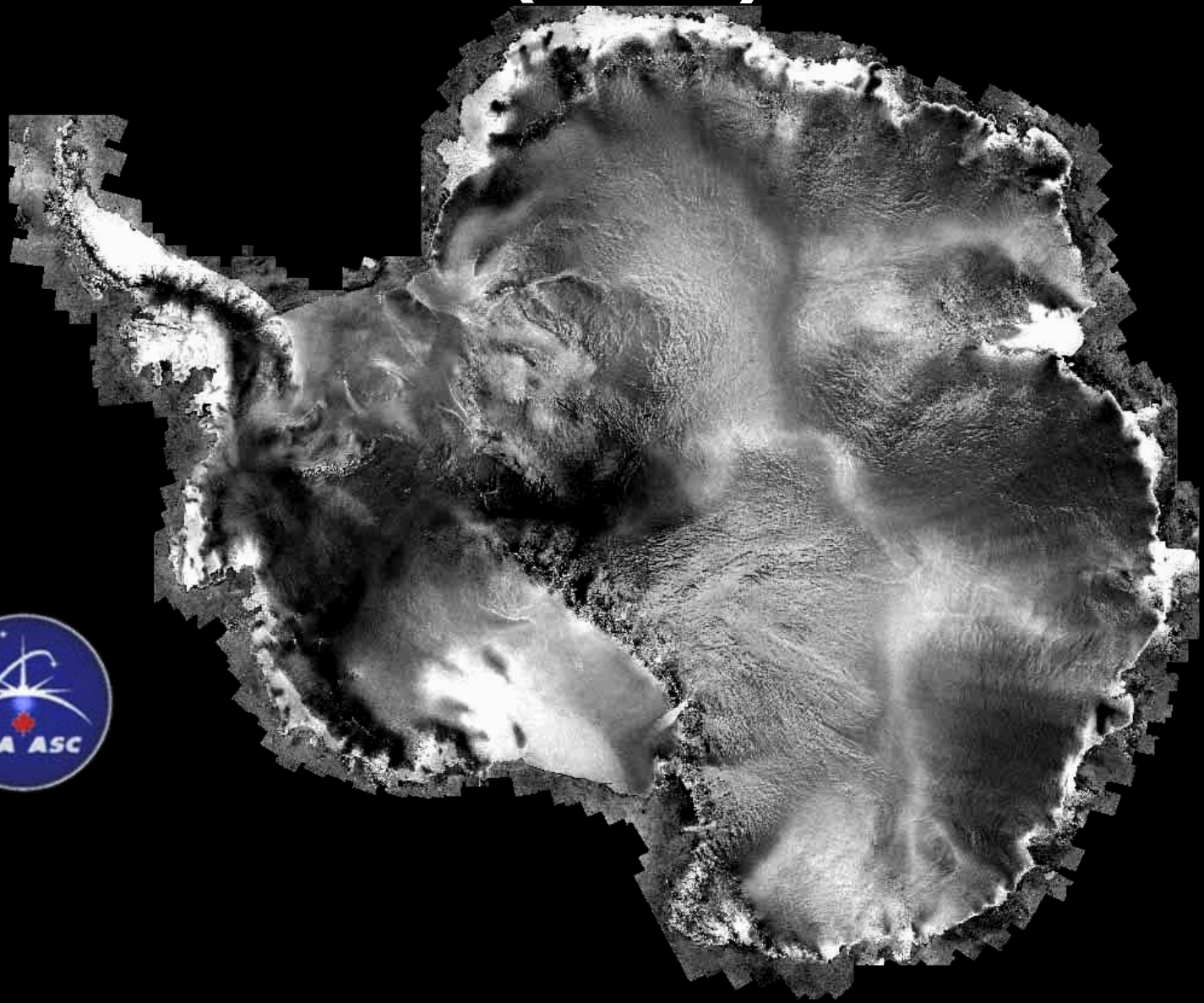
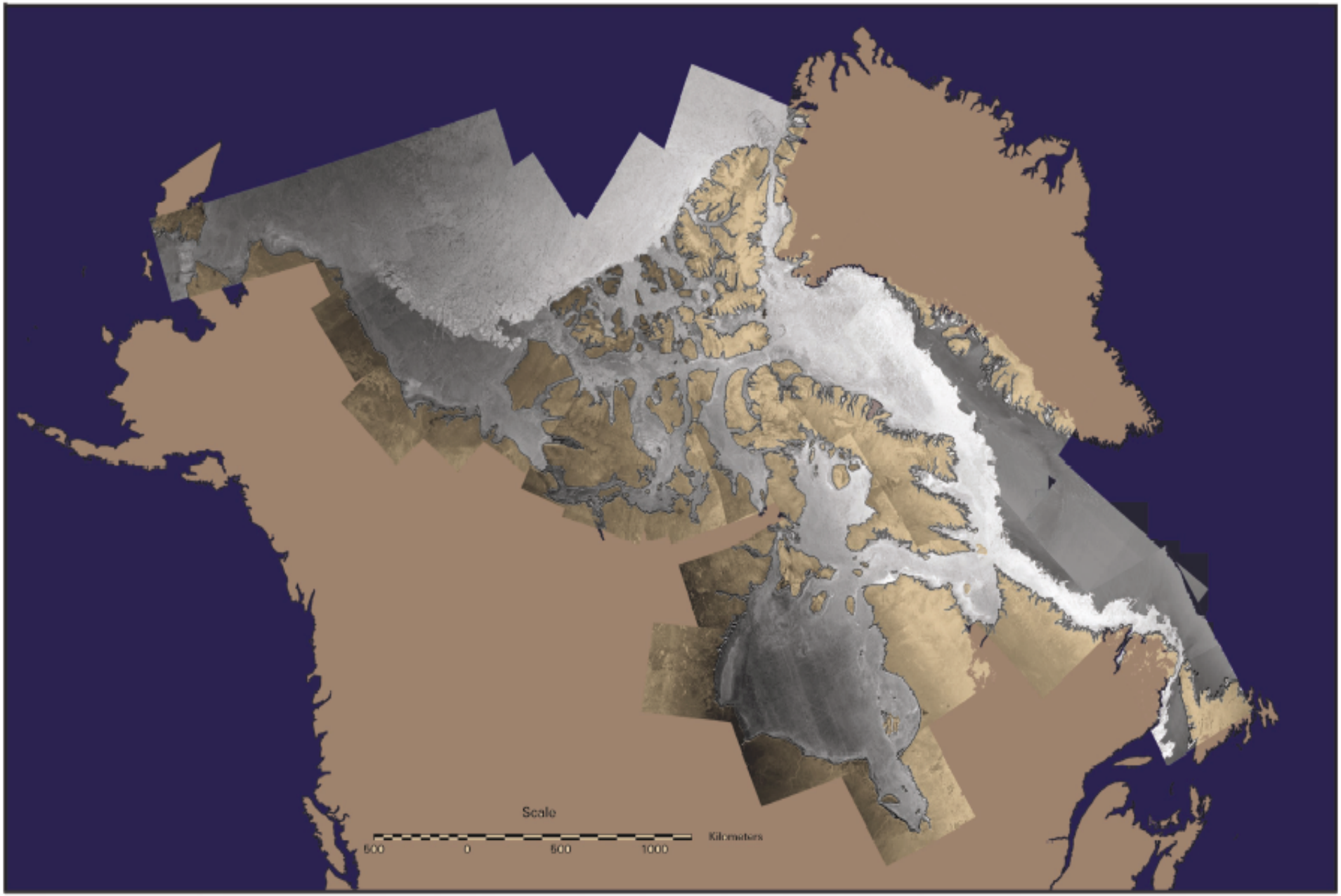
High resolution RADARSAT-1 image mosaic of Antarctica (AMM)





Environment Canada Environnement Canada

New Potential Mapping Initiatives

- 3rd Antarctic Mapping Mission
- Greenland Mapping Mission (InSAR)
- Polar Snapshots – Sea ice (CIS)
- Arctic Ice Mapping Mission – (AIMM)
  - Ellesmere,Alex Heiberg, Devon, Baffin, Bylot
- Canadian Arctic Land masses

RADARSAT Data Treasury

- Challenges
  - Data policy
    - Distribution framework for Radarsat-1: Commercial
    - Radarsat-2 owned and operated by MDA – use of Canadian Government Data Allocation
    - Restricted to science use – NO operations supported
  - Identification and processing "science-relevant" datasets – through consultation
  - Non-intuitive nature of SAR data – definition of data and information products for broad distribution

RADARSAT Polar Science Gateway

2. Portal

- **interfaces** designed **for scientists**, **information product users**, and **northern community users**
- welcomes **traditional knowledge** and **queries** from it
- **links / integration** with other portals
  - CCIN, Arctic Spatial Data Infrastructure, PolarVIEW, GIIPSY, etc…

RADARSAT Polar Science Gateway

3. Diffusion, outreach & capacity development

- Work with Northerners on northern issues
- Adapted training and capacity building
- Needs to develop a strategy to promote optimal design & use for Canadians
- Consult the ultimate surrogates and intermediate stakeholders (scientists) to use and develop the treasury
- Anik F2 potential for telecommunications bandwidth
- 3 northern community access terminals

Financing

- from I**PY Federal Program budget**
- Radarsat-2 Canadian Data Allocation
- by **partners' funding**, including some from Canadian IPY and other national IPY
- **CSA staff time** and **O&M** to manage it

- **continuation** after IPY

Summary: Outputs & Outcomes

- RADARSAT data & products are put into use
- New partnerships with science and clients / users. A known strategy and hub for northerners and northern applications
- World-contributing new northern EO presence and strengthened Antarctic EO presence
- Contributing to Canadian goals for northern sustainability, resources management, sovereignty, and science
- Canadian satellite EO coordinated with global goals and data demand and supply.

Action Plan

- Consultation to guide strategic development of RSAT Polar Science Gateway and optimal use of its resources
- Consultation with end-users for a data plan
- Coordination among the space agencies within the GIIPSY framework
- Coordination with other Information Network managers and linkages
- Seek additional partners (via IPY & other)
- Liaison with Canada IPY
  (steering committees, possible further proposals)
- Coordination & agreement

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Confirmed Collaborations

International Polar Year 2007-2008

Applied Physics Laboratory
College of Ocean and Fishery Sciences
University of Washington

The Ohio State University

c-core

Environment Canada | Environnement Canada
Atmospheric Science and Technology Directorate
Science and Technology Branch

JPL

VEXCEL Canada Inc.

Ressources naturelles Canada | Natural Resources Canada
Géomatique à l'appui au développement du nord | Geomatics for Northern Development
Centre d'information topographique | Centre for Topographic Information

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